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ABSTRACT

A study of the writing of 11 minority group students in a college biology class explored two questions: (1) how the difference between well-shaped and poorly shaped writing could be described, and (2) how the various pieces of writing of an individual student could be compared. The study concentrated on a contrastive analysis of two pairs of students that rated the linguistic maturity of their writing based on the frequency of predications, or deep-structure related sentences. The writing of each student was classified in one of three developmental stages: chunk-style (simply listing unrelated chunks of information), chaotic (attempting to relate information without a coherent framework), and integrated (combining relational and content information). The conclusions drawn were that there is a developmental sequence in the growth of writing ability, that the in-class essay is difficult to produce, and that a particular style of discourse imposes on the writer a particular cognitive demand. (AEA)

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Student Writing in the Academic Context: A Linguistic Study of Well-Shaped vs. Poorly-Shaped Essays with Implications for Learning and Teaching

Suzanne E. Jacobs

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Introduction It is a commonplace among teachers of composition and increasingly among all academics that college-age students have difficulty writing essays that bear directly on the question they are asked. Not that this is a new problem. I can remember more than 20 years ago my own freshman composition instructor saying, "Just answer the question straight out." But students everywhere continue to write plot summaries instead of the evaluations or character analyses they are asked to write. They write summaries of their lecture notes instead of the argumentative essays they are asked to produce. In sum, they write prose that is not shaped to the expectations of the reader or audience. Linda Flower[1] has called such writing Writer-Based rather than Reader-Based because at the same time that it serves the Writer in some sense--perhaps as a means of memory recall--it fails to tell the Reader what he or she wants to know. The phenomenon is disconcerting, particularly in academic courses, because professors want to evaluate more than the student's skill at recall. They want to know whether students can discover and express relationships and insights. Can the student writers select and reject information for its relevance to the question at hand, and can they arrange details so that they support the writer's point of view? To do so is a crucial skill.

The Problem The present study takes it for granted that the problem is more than a failure on the part of the students to understand directions, and that given the pervasiveness of the problem there must be a common pattern, either in the mental set of the students or in the difficulty of the writing task. To study this particular problem is to study the larger questions of language, thinking, and cultural expectations. The culture of the classroom imposes rather strict expectations as to

language performance, and language performance is taken as evidence of intellectual ability.

The study posed two kinds of questions, one linguistic and one pedagogical. First, how could the difference between the well-shaped writing and the poorly-shaped writing be linguistically described? And, second, assuming that pieces of student writing could be described in this way, how did the various pieces of writing done by a single student compare? If they were ill-shaped, did they change as time went on? Did they become better? If so, in what way? why? under what conditions? What could be said about the composing processes of the student who produced the well-shaped prose? Were these processes somehow more difficult than the processes of writing poorly-shaped prose?

Methods The methods were those of a case study, qualitative and descriptive rather than quantitative and experimental. I administered and collected essays from a group of biology students enrolled in a special admissions pre-medical review program designed for minority students from Hawaii and islands of the South Pacific, a group highly motivated and yet quite likely to produce at least some poorly-shaped writing. Their weekly writing task was typical of the essay examination because the direction of the essay was tightly constrained by the biology instructor. She wrote a general first sentence, rather like a topic sentence, that was to be the lead-in sentence of every student essay. For instance, the sentence

Muscle cells are cells specialized for contraction.

led naturally into a discussion of various fibers of the cell and

the way they work together to produce "shortening" or contraction. The students were to copy the lead-in and then to follow on from this point, writing (without notes) about two pages on wide-lined paper in an hour's time. Since the material for the essays came from rich course lectures, it was ample in quantity. The fact that all eleven students had access to the same information made a comparison of their writing easier and more interesting than it otherwise would have been.

I collected also two kinds of supplementary data. The first kind consisted of passages from biology textbooks as well as samples of the language used by the course professor in lecture. The second kind was information about the students. I tape-recorded an interview with the students about their language and educational background (some were not native speakers of English), about their methods of studying, and about their perceptions of the writing exercise. I had access to a record of scores on multiple-choice tests for the biology course. And I also had several discussions with the two professors for the course, who were interested in the struggle made by each of the eleven and who would eventually recommend for admission to the medical school those whom they thought capable of the work load. From them I obtained a judgment about the study habits of each student. Much of this supplementary data is summarized by Tables 1 and 2, Appendix A. The tables show students arranged in three groups. First is the high group, which performed well on multiple-choice tests and wrote well-shaped essays. Last is the low group, which nearly always failed the multiple-choice tests and wrote

essays that though well-shaped were generally lacking in information, far too short, repetitious and vague. Though interesting, the problems of the low group were not studied in detail, because the purpose of the study was to look at the shape or coherence of writing which contained material in quantity. The study concentrated on a contrastive analysis of two students selected from the high group, Richard and Carol, with two students selected from the middle group, Rudy and Tomas. All four had good control of the material, but Rudy and Tomas showed the classic problems of poorly-shaped writing. The analysis focussed not only on the differences between Rudy and Tomas and the other two but also--and especially--on the experience and the writing of Rudy and Tomas as they progressed through the semester.

the linguistic methodology The linguistic method was to check each sentence of a given paragraph in the student essay with three features that were judged to be necessary for well-shaped prose of this discourse type.

First, the topic of each sentence was nearly always a reference to the human body or some part of it. Here "topic" is used--as Gundel,[2] Chafe,[3] and others use it--to mean the item of old information in the sentence which the writer is writing about. It is "old" in the sense of having reference to something earlier in the discourse, something either implicit or explicit. In order to insure that each sentence topic was really old information to the reader, the writer was required to make use of a cohesive device such as a repeated noun phrase, a pronoun,

or what Halliday and Hasan[4] call lexical cohesion.

Second, this particular style of prose required the present tense form, either active or passive in mood but without the progressive ("ing") ending or the HAVE aspect (or auxiliary). Sometimes the modal "will" was appropriate but without any real sense of the future. In fact, the required tense was a sort of timeless present suitable for describing the general human body outside of any particular framework of time. People say, "The heart has four chambers" but not "The heart had four chambers" unless referring to some particular human body or perhaps to evolutionary history. Since the student essays were not directed toward the discussion of a particular body, to what people used to think about the body, to their lab work, or to evolutionary history, there was no occasion for past tenses, or any time framework at all.

The third feature was by far the most complex, for it was concerned with rhetorical relatedness. While I had no quarrel with the traditional terms of rhetorical analysis such as CAUSE, COMPARISON, and SPECIFICATION, I believed that for the present study there had to be some attempt to explain how the links were related to syntactic units. My method of doing this syntactic sort of rhetorical analysis was based on the following argument.

Each rhetorical link is a semantic idea, but it is also more than this. There is good evidence that each link is actually a statement, for one can express rhetorical ideas in statement form, as in the sentences "The fox and goose are different" or "Something causes something." In both sentences the rhetorical idea occupies the position

of main predicate. The main verb asserts that there is such a relationship as difference or cause. Like other sentences--and here I take for granted a transformational framework--these can be syntactically manipulated. The sentence "The fox and goose are different" can become the nominal phrase "the difference between the fox and the goose," or to look at the process in reverse, one can claim that the nominal phrase is derived from the deep-structure sentence. In this way, even adverbials such as "by contrast" can be derived from deep-structure sentences. Underlying the surface sentence "The fox, by contrast, is glib" there are two deep sentences, one asserting that the fox is glib and the other asserting that the fox is different from something, perhaps a strong and silent goose mentioned earlier. Thus, about the fox there are two predications and two types of predication. One is a content type--that the fox has the attribute of glibness--and the other is a relational type--that the fox has such-and-such a relation, let's say to the goose.

One can argue further for a syntactic analysis of rhetoric by citing cases of ambiguity, a traditional mode of argument within a transformational framework. In the ambiguous sentence "The fox also wears purple," the word "also" can assert that the fox is like another being--both beings wear purple--or that the fox wears purple as well as another color, say blue or red. In both cases the deep-structure content sentence is the same--the fox wears purple--and what differs is the relational sentence. Thus, the difference in meaning can be explained, within a transformational framework, by the presence of different relational deep-structure sentences.

Needless to say, such sentences (or "predications" as they will be termed from now on) are understood by the reader even when no connective phrase like "similarly" or "by contrast" is present in the sentence. Readers are made to understand the relationship by a variety of other clues.

For the biology essays the presence of such relational predications was a crucial feature. Well-shaped passages generally had two to four relational predications underlying each surface sentence. There could be more than one because there were relationships not only across sentence boundaries but also between content predications underlying surface sentences. Poorly-shaped prose, by contrast, contained several surface sentences that contained no relational predications at all. These were sentences that did not follow through on the line of argument established by the lead-in sentence, even though they were topically related to the first.

For illustration, examine the passage below. The lead-in sentence of the passage directs the students to name parts of the immune system located along the digestive tract, such as tonsils, and to show how they function as fighters against harmful bacteria. But, beginning with the third sentence below, the writer provides information inappropriate for the context. Thus, the relational predications one expects to find are missing.

> 1) <u>lead-in</u> The digestive system has immune system components. 2) These components are found in the walls of the digestive system. 3) The walls of the digestive system consist of four distinct layers. 4) The four layers are mucosa, submucosa, muscularis externa, and serosa. 5) The mucosa layer of the digestive tract is composed of three layers. 6) The mucosa layer is the innermost layer of the four distinct layers. 7) It is the layer that is closest to the lumen of the digestive tract.

A sentence-by-sentence analysis of this passage is provided below, showing how each surface sentence breaks down into predications.

	No. of types	No. of predications		
1.				The digestive system has immune system ..
2.	1	1	a. Type 1	These immune system components are found...
3.	1	1	a. Type 1	The walls of the digestive system consist...
4.	1	1	a. Type 1	The four layers are mucosa, submucosa...
5.	1	1	a. Type 1	The mucosa layer of the digestive tract...
6.	1	1	a. Type 1	The mucosa layer is the innermost layer...
7.	2	2	a. Type 1	The layer is close to the lumen...
			b. Type 3	It COMPARE other layers

Number of sentences with relational information: 1 out of 6 or 16 per cent.

Average number of predications per sentence: 1.16.

The revealing and most important feature is the lack of relational predications, called here Type 3 predications. For the whole passage there is only one, a comparative relationship expressed by Sentence 7. Another point revealed by the analysis above is the lack of what are termed Type 2 predications, these being deep-structure sentences with verbs of the dynamic type such as <u>contract</u>, <u>flow</u>, <u>expand</u>, <u>diffuse</u>, and so on. Almost every predication for the whole passage has a statal

verb--are found in, consist of, are, is composed of, and so on. Thus the information provided in this passage is information about the state or condition of the body, Type 1 information, and not about the function or working of the body, Type 2 information. Statal and dynamic verbs are syntactically quite different, as linguists such Huddleston[5] have pointed out, and in this case both types of verbs were needed to meet the demands of the assignment. The lead-in sentence directed the student writer to show how body organs such as tonsils function or work as fighters against harmful bacteria, but he did nothing of the sort. The analysis above, showing neither Type 2 nor Type 3 predications, is a picture of what the student did not include. Well-shaped prose is thus partly a matter of the right kind of information, or relevance, and a suitable combination of information, or complexity.

The passage below contains not just Type 1 information but a combination of types. Type 3, or relational information, is present in every sentence. The second sentence specifies the lead-in sentence, the third sentence generalizes on the second, the fourth specifies the third, and the fifth generalizes on the fourth. Moreover, Sentence 3 has two causal predications.

> 1) Several body systems are involved in maintaining salt and water balance. 2) They include the digestive system, the urinary system, and the skin's secretory system. 3) All of these systems involve the secretion of sodium ions since sodium is the ion that causes water to flow across cell membranes. 4) If sodium salts are secreted, water follows. 5) That is the law of osmotic transport.

	No. of types	No. of predications	
1.	lead-in		Several body systems are involved in maintain...
2.	2	3	a. Type 3 Sentence 2b SPECIFY Sentence 1 b. Type 1 They are the digestive system, the urinary... c. Type 1 The skin has a secretory system
3.	2	5	a. Type 3 Sentence 3b GENERALIZE Sentence 2 b. Type 2 They involve secretion of sodium ions c. Type 3 Sentence 3d CAUSE Sentence 3b d. Type 3 Sodium CAUSE Sentence 3e e. Type 2 Water flows across cell membranes
4.	2	4	a. Type 3 Sentence 4 SPECIFY Sentence 3e b. Type 3 Sentence 4c CAUSE Sentence 4d c. Type 2 Sodium salts are secreted d. Type 2 Water follows
5.	2	2	a. Type 3 Sentence 5 GENERALIZE Sentence 4 b. Type 1 This is the law of osmotic transport

Number of sentences with relational information: 4 out of 4 or 100 per cent.

Number of relational predications: 7 in 4 sentences, or 1.75 per sentence.

Average number of predications per sentence: 3.50.

A comparison of the two passages clearly shows that the second one carries <u>more</u> predications, more <u>types</u> of predication, and especially more relational predications than the first one. Whereas the first carries an average of 1.16 predications for each sentence (7 predications divided by 6 student-written sentences), the second carries 3.50. Whereas the first contains only one type of information, the second carries all three types. Whereas the first contains only one relational

predication, the seconnd carries seven. The overall difference is one of load. The term "predication load" is used in this report to refer to all the information that the student writer integrates at the point of constructing a sentence.

How great a load, then, was necessary for well-shaped essays? Three to four predications on the average per sentence (3.00 to 4.00) was characteristic of the passages judged coherent, though there were occasional sentences of only 2.00 that did not detract. As for relational predications, all sentences had to have at least one. When, for a whole passage, the average number of relational predications per sentence was less than 1.00, there was a real problem with coherence, or "shape." But the difference between, say, .12 and .75 was a revealing difference. The writer of the second piece (the .75) was attempting to integrate, whereas the first writer (the .12) was quite off the track from the point of view of the reader. An average of 1.00 was a borderline case, and the well-integrated prose ranged from 1.50 on up, though averages higher than 1.50 did not increase accordingly in quality.

Results: predication loads The results of the analysis are quite simple to report. Predication loads remained fairly constant over the course of the semester for most of the students. For Richard and Carol in the high group they were high on every sample. For Rudy and Tomas, however, they were low at the beginning, high at the end, and mixed in the middle. Their early samples contrast with the later ones in the average number of relational predications per sentence:

	early samples	later samples
Rudy	.75 .12	1.14
Tomas	.40	1.50

There is also a contrast in the total number of predications, indicating that the general complexity of each sentence increased in the later essays.

	early samples	later samples
Rudy	1.87 1.25	2.86
Tomas	1.60	4.25

The last four or five essays all carried acceptable predication loads, providing evidence that Rudy and Tomas had learned to shape their prose to meet the demands of the discourse type.

But how did this change occur? How did it show itself on paper, and what caused the student to make the change? First, allow me to describe in some detail the change as it appeared on paper.

the chunk style The early essays for both students can best be described as chunk-style. Typically the students chose a noun from the lead-in sentence, associated it with a chunk of information with which they were familiar, and proceeded to reproduce the chunk on paper, keeping it intact. The passage cited earlier, beginning "The digestive system has immune system components," prompted the student to write what he knew about the digestive system. And what he knew

about the system--which was a great deal--began with information about the various layers of tissue in the wall of the alimentary canal. Information could not be left out, even if irrelevant to the assignment. When the lead-in asked for a discussion of the muscle cell--how its structure was specialized for contraction--the students produced chunk of information about the muscle cell. The cell was of three types--smooth, cardiac, and skeletal. The smooth type was located in such and such body organs. It was involuntary. It was longitudinally striated. It was narrow. It had one centrally-located nucleus, and so on. When Rudy finished with the smooth muscle, he went to the second type, and when finished with the second to the third. But what was the link with contraction?

Clearly Rudy and Tomas, in studying their information from lecture and textbook, had learned not only the information but the whole organizing principle as well. Sometimes it was a narrative structure, but more often it was the form illustrated earlier, a descriptive form in which a noun phrase like "muscle cell" is followed up by a series of attributive sentences, or Type 1 ("statal") information. This is a simple form with low predicational load and not an appropriate form for the essay assignment given. But it is commonly used in science textbooks, especially in the introductory passages of chapters, as shown by my own analysis of both college-level and elementary-school texts.

It has a structure something like:

Meet my sister Mary.

She lives in Newton, Mass.

She has three children, Algernon, Toby and Elizabeth.

Her husband is in insurance, and she goes to night school three nights a week.

A characteristic of this style is that sentences can change their place in the paragraph with little damage to the coherence of the whole. Some sort of overall impression no doubt emerges after several sentences, something that connects the various predicates, but the effect is cumulative rather than a step-by-step unfolding or progression. Instead of rhetorical connectedness--expressed by Type 3 predications--there is connectedness between sentence topics, and some sort of parallelism between verb features. Coherence of this type seems cognitively simpler than the type demanded by the classroom essay. It is not surprising that when students feel they can write information in whatever order they please--and both Rudy and Tomas felt this way in spite of the instructions--then they choose this linguistically simpler form. Memory no doubt plays a part, in that students write information in the order they remember it, but in memory also linguistic form plays a role.

<u>the developmental stage</u> Whereas the first stage was characterized by "chunks" of information, which were easy in themselves to read and follow, the second stage could only be described as truly incoherent and impossible to read. The following excerpt, from Essay 3, is an example, which the reader is not required to read but invited to puzzle over as I did.

Essay 3 (excerpt)

1) Certain characteristics contribute to important functional differences between cardiac and skeletal muscle. 2) (sentence fault) are primarily related to the movement of certain intracellular and extracellular inorganic ions. 3) The primary functional difference between skeletal muscle and cardiac muscle is due to the rate of contractions. 4) The rate of contraction of skeletal muscle is much slower than the rate of contraction in cardiac muscle. 5) The rate of contraction in muscle cells are directly influenced by the permeability of the muscle cell membrane to certain ions. 6) The change of the muscle cell membrane permeability, as a result of nerve stimulation, can cause an action potential to be generated throughout the cell membrane. 7) The magnitude of the action potential is somewhat directly proportional to the rate of contraction. 8) The principal inorganic ions which plays an important role in muscle contraction are calcium, sodium, and potassium. 9) Potassium is the principal intracellular ion, sodium is the principal extracellular ion and calcium is an important ion that promotes muscle contraction.

In this passage, the lead-in sentence says that differences in the structure of cardiac and skeletal muscle are suited to their differences of function. Rudy, in writing the sentences that follow this sentence, attempts to remain relevant to this idea. He wants to say that the different membrane properties of the two kinds of muscle cells allow for ions such as sodium and potassium to move in and out of the cell in

greater or smaller quantities. This difference, in turn, is responsible for different rates of contraction for the two kinds of cells.

But the words "different," "greater," and "smaller" are atte mpts to integrate relational information with what were, for Rudy, two separate lines of thought, one line about skeletal muscle and one about cardiac. He had extreme difficulty keeping his information about these muscles, Type 1 information, subordinate to the comparative purpose. The result--and what accounts for the hodge-podge effect--is a series of unconnected sentences, some of them with comparative force and some without. Sentences 6 and 8 have no connection to the comparative ideas in Sentences 3 and 4. Sentence 7 tries to be a bridge back to the earlier comparative idea, but in so being breaks up whatever flow might have been created between 6 and 8. Sentences 8 and 9 are completely cut off from the rest of the paragraph and logically quite out of order.

At this point in the semester there is a trade-off between relevance and readability. Rudy's earlier work, though totally irrelevant, was smooth and readable. But now, when he tries to advance the assertion made in Sentence 1, he produces chaotic prose. In a sense, however, his hodge-podge essay is a sign of development, for the long chunks are being broken up. The sentences most disruptive in the line of thought in the passage above are attempts to re-establish a link with the lead-in sentences. Each of these, in other words, is mainly a

Type 3 predication. Though not very well integrated with the content information, they are, at least, there.

the sentence level The dull, clumsy sentences in the passage above (numbers 3, 4. and 7) are an indication that relating work is in progress, in this case comparison. Sentences of this type, in fact, could be called "working sentences," for it is clear that in writing them Rudy had to fumble and search for a means of expressing the comparative relationship. He no longer had the fluency and confidence he had when writing chunk-style information.

Consider the problem, for example, of saying (and these are my phrases) that "the more alveolar ducts there are, the more alveoli there will be, and the more alveoli there are, the more surface area, and the more surface area, the greater the opportunity for efficient gas exchange." Consider the Type 1 predications (that there are alveolar ducts, alveoli, surface area, opportunity, and gases), the Type 2 predication (that gases exchange), and the very important Type 3 predications (that comparative relationships expressed by "more" are caused by other comparative relationships). Consider then the problem of the writer who is not completely at home with the construction "the more (something), the more (something)." Then, perhaps, one may understand what was happening as Rudy wrote and crossed out the following words:

> Therefore, the more alveolar ducts ~~there~~ in the lungs will have more alveolus and hence, a greater ~~exchange of gas carbon dioxide and oxygen~~ surface area for gas exchange to take place efficiently.

To write either relational or content sentences is not a problem. But the integration of the two types is understandably difficult.

The earlier analysis of predication types suggested that the relational predication could surface in two different ways: (1) as the main predicate (X is an example), or (2) as an adverbial phrase (X, for example). Or it might not surface at all but still exist as a deep-structure predication in the sense that it is an important part of the understanding of the sentence. From the writer's point of view, then, there is a choice of stylistic options. It is interesting that most of the students chose the form that seems to me most difficult to use, the first one above or the form in which the relational idea becomes the main predicate of the surface sentence. This form, called here "the relational form," proved to be rigid and clumsy, for it forced the writer to put his content information into subordinate or embedded positions. The problem with Rudy's sentence above was in not knowing how to do so. Carol frequently used clumsy phrasing for the same reason. She wrote:

> One of these characteristics are skeletal muscles are multinucleated.

where the main predicate is used to assert a specifying relationship. She could have subordinated the relational idea and made the content sentence the main predicate:

> Skeletal muscles, for example, are multinucleated.

In general, the grammatical and stylistic problems with sentences

became more severe and greater in number when the sample passage was high in predication load. It was the forced integration of predications--and in particular the imposition of relational on content information--that led to the clumsiness, wordiness, and grammatical faults. Only one student, Richard, seemed able to handle the burden of high predication load with ease. Unlike the others, he generally made his content predications the main predications and expressed the relational ideas in subordinate ways, or left them implicit. Whereas the others tended to say one thing at a time--to make first a relational statement and then a content statement--Richard tended to make both statements simultaneously.

attitudes, habits, and perceptions Turning now to the students themselves--mainly Rudy and Tomas--one asks how the change in their prose was related to their attitudes, habits, and perceptions. Why didn't they change earlier? Why didn't they understand the directions to "follow" the lead-in sentence? How did they come to change?

As to why they changed, there were a combination of factors and it is difficult to say which one was most important. Each week I returned their essay, complete with grade, corrections, and a comment about the quantity and relevance of their details. I also gave them a dittoed copy of a model essay--either the best essay in the group or a composite essay of the best ones. In the case of Rudy and Tomas, whose essays were off the point for several weeks in a row, I made pointed comments about relevance, talked to them in class, and finally returned one essay with all the irrelevant sentences circled. These

sentences, I said, counted against their grade. Then I collected the remaining sentences, copied them onto another sheet of paper, and said that these would make a relevant essay. This comment must have hit some deeply-held value, for Rudy said to me in the next class, "Why I get so low grade? I write all true things." He actually wrote one more slightly deviant essay, but it was clear that he wanted to learn this skill, and his last four were quite well-shaped. The pattern was similar for Tomas except that he changed earlier in the semester.

As to why they did not change earlier--when the model essays showed clearly what they were to do--one must understand that they had made a good deal of investment in the structure of their material. They had spent a long time memorizing certain packages of information, and to have done so marked the difference between failure and a measure of success. For Tomas, the ability to study had earned him a scholarship to a U.S. mainland university after a year at the University of Guam. Rudy had done little studying in high school, he told me, and had only learned to buckle down while in a small mainland college. Now he knew what it was to study. They could try to flunk him out, but no one--no one--would be able to keep him from getting into medical school. If he flunked out once, he would come back another year.

Moreover, it was clear from both conversation and his essays that Rudy conceived of information as belonging to a set order, which had beginning, middle, and end. If a piece of information was needed, then it was necessary to begin at the beginning of the structure to which

it belonged. The story of hormones, for example, was seen as beginning with the glands from which hormones are secreted. The next step is the travel of the hormone through the bloodstream to the target cell or organ. The third step is the action in the target cell triggered by the hormone. When it was necessary to extract just one bit of information from this sequence, in order to give an example of a hormone that had more than one target cell, Rudy found himself caught by the narrative sequence. He began with the gland and gave four sentences of narration before coming to the relevant detail in Sentence 5.

Other students too were inclined to view certain information as fixed within a sequence. When the subject was the circulatory system, then the information began, in their view, with the heart. When asked to write about the way blood vessels affect the flow of blood, they were quite befuddled. One student finally looked up, laughed, and said, "You can't start there." The blood vessels did not rightly enter in until later in the story after the blood had traveled out of the heart, through the arteries, and into the smaller arterioles. So binding was the story of circulation, as it was usually told, that several of the students could not see the events of circulation structured in any other way.

The eleven people in the class could be categorized according to the extent to which they were bound by information structure. Rudy and Tomas were certainly the most. The other nine were much less so. But among the nine there were six who seemed unable to remember facts and information

in quantity and who would have done well to emulate Rudy and Tomas. Of the non-native speakers, only Tomas was able to gain sufficient mastery over the material, in this his second try at the program.

It was surely a cognitive effort of some proportion both to store the reqauired quantities of information and also--on command--to shuffle the information so as to create a structure appropriate to the writing task. Richard and Carol in the high group structured and re-structured as though it were second nature to them. Not only were their essays impeccably organized and almost free of irrelevancies, but they were also shorter than those of Rudy and Tomas. They wrote less and spent more time looking in the air than did Rudy and Tomas; the signs of conscious manipulation were there. It was clear that they structured information as well as Rudy and Tomas and could retrieve it in quantity, but also that, for them, information could belong to more than a single structure. They were familiar with the idea of alternative structures and linguistically proficient in dealing with them.

This was most true of the top student, Richard. In his interview, when asked how he studied his information, he showed that he organized the course material hierarchically. He said that he started with the body as a whole and that he thought next of the systems that make up the body, the organs that make up the systems, the various components that make up the organs, and the cells that make up the components, and finally the parts of the cell. After that, one came to cell chemistry.

But, he said, you could also think of the information as beginning with the cell chemistry. What happens there affects what happens to each bigger component up the line. So one could go down the hierarchy, or up, it made no difference. One could also think of the structure of the body vs. the function of the body and relate each piece of anatomical structure to the job performed by it. Or, he said, you could order the information of the course in terms of a battle between health and disease. Certain events occur under pathological conditions and others occur under healthy conditions. All of this is what he said when I asked him how he studied.

Implications and Conclusions Writing the well-shaped essay was easier for Richard than for Rudy because he had skill and experience in using relational language. He handled quantities of information efficiently for purposes of test-taking, and he also managed the complexity necessary for writing sentences that carried a heavy load of predications. Rudy was less fluent with the type of language required for combining and recombining information.

The study suggests a developmental sequence of the kind so often discovered in patterns of learning. The grammatical errors made by Rudy in the process of using relational language were the sort that can be tolerated for the sake of the larger learning. They are not so serious as the potential problem of never learning to shape information for a particular purpose. While his earlier writing was grammatically almost correct and readable, it showed no evidence at all that an intelligent mind was at work. Faulty sentences were the result of a healthy attempt

to deal with much more complicated information than he had dealt with earlier.

The study helps to explain why the academic in-class essay is difficult to produce. The essay demands, first of all, more relational information than either textbooks or lectures show. Some students who seem to be familiar with the discourse style can produce it only when they have little information at their command. Their essays turn out to be vacuous, as shown by the experience of the low group. The experience of the middle group suggests that when chunks of information have been newly acquired, they interfere with the writer's sense of the discourse. To have genuine control of the discourse style--to be able to use it at the same time as using newly acquired information--is difficult indeed. Yet, if the cases of Rudy and Tomas are typical of the student who produces poorly-shaped writing, then their experience suggests that almost any discourse style can be learned. Motivation, control of information, frequent practice, simple feedback, and model essays may all be necessary factors.

It is important to say that the type of academic essay under study here is not the only important kind of academic writing. There are clearly instructional purposes best accomplished by writing assignments whose main thrust is <u>not</u> relational. A narrative assignment, for example, may allow greater emphasis on the visual, the immediacy of the event, and the sense of "being there," and thus engage the feelings of the student.

The present study emphasizes that a particular style of discourse imposes on the writer a particular kind of cognitive demand. For purposes

of in-school writing, the study may make teachers aware that in shaping a writing assignment, they make choices about the kind of thinking and language the student will use. Such choices should be carefully made.

Table 1 The Subjects Grouped According to Academic Success: Their Language, Ethnicity, and Educational Background

Name	Academic Group	First Language	Ethnicity	Educational Background
Richard	High Group	English	Hawaiian/ Japanese	Selective private high school, Honolulu, college in Honolulu, a few years doing other things after college
Carol		English	Hawaiian	Private high school in Honolulu, mainland college
Carl		English	Portuguese	Parochial high school, Honolulu, mainland college
Tomas	Middle Group	Chamorro and Carolinian	Carolinian (Micronesia)	High school in Micronesia, college in Guam and U.S. mainland
Rudy		English	Filipino	High school on Maui, mainland college
Marilyn		English	Japanese	High School on island of Hawaii, college in Honolulu
Kimberly		English	Hawaiian/ Chinese	Private high school in Honolulu, college in Honolulu
Raphael	Low Group	Yapese	Yapese (Micronesia)	High school in Micronesia, one year in Washington, D.C., mainland college
Fatui		Tongan	Tongan (Polynesian)	High school in Tonga, Honolulu college
Tua		Samoan	Samoan (Polynesian)	High school in Samoa, mainland college
Jesus		a Micronesian language	Micronesian	Complete information not available; presumably high school in the Pacific and college on the U.S. mainland

Appendix A

Table 2 The Subjects: Their Study Habits, Control of Information, and Grammatical Correctness Before the Course

Name	Academic Group	Study Habits	Control of Subject Matter	Correctness	Writing Selected for Analysis
Richard	High Group	good*/efficient	good	good	x
Carol		good/efficient	good	fair	x
Carl		good/usually efficient	good	good	
Tomas	Middle Group	good/not efficient	good	fair	x
Rudy		good/not efficient	good	fair to poor	x
Marilyn		vacillating	vacillating	excellent	
Kimberly		vacillating	vacillating	excellent	
Raphael	Low Group	sometimes good/ not efficient	poor	fair	
Fatui		sometimes good/ not known	poor	fair to good	
Tua		good/not efficient	poor	fair	x
Jesus		not good/not known	poor	poor	x

*"good" means "put in the time"

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